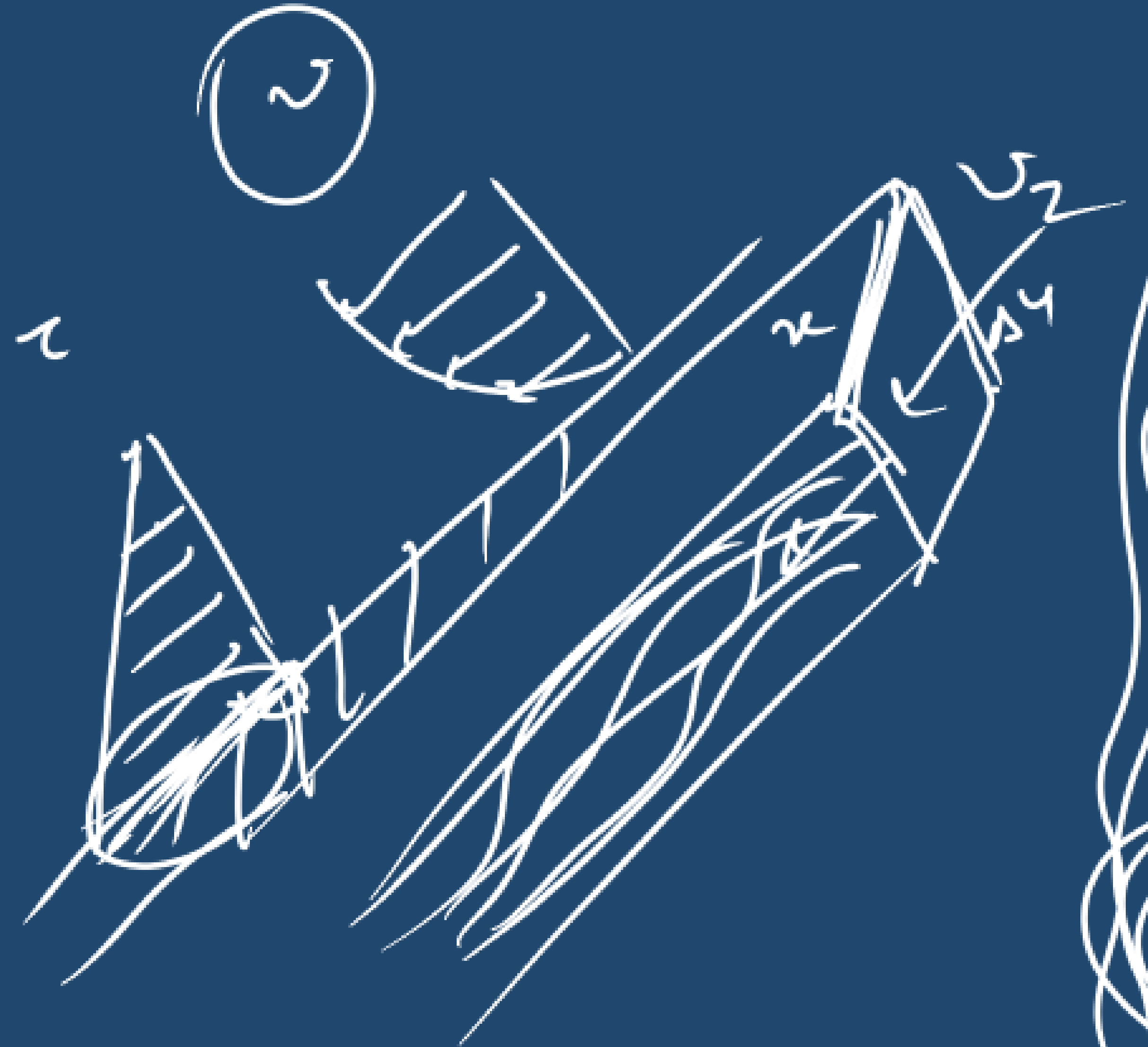
1st information

$V_z = f(y) \rightarrow \delta$

$\langle V_z \rangle = \dfrac{Q}{A} = \dfrac{\iint V_z \, dx\, dy}{\iint dx\, dy}$



$V_{z\,max} =$

$V_{z\,min} =$

Q

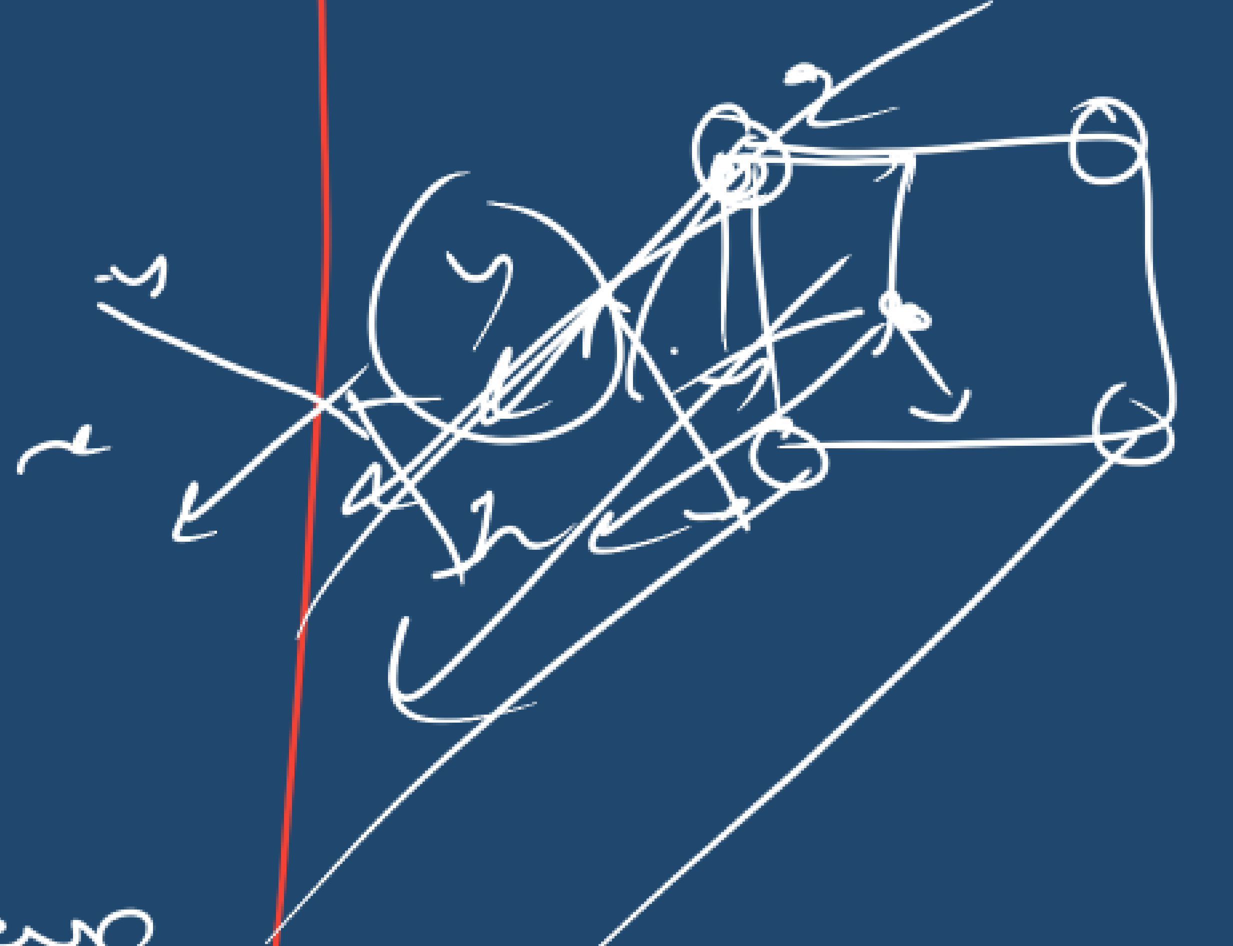
τ at any pt

film thickness (δ)

selecting origin

system

$S \begin{cases} +S/2 \\ -S/2 \end{cases}$



① → +ve axis in the dir of flow

② Symmetry of system

Analysis

gravity effect

gravity

non-gravity

Cumulative exp

$P = \rho g h$

atm

$P = P \pm \rho g h$

non gravitational Press

Selection of origin

$\pm$

①

$z \downarrow \quad \downarrow h$

same dir^n $(-ve)$

$z \uparrow \quad \downarrow h$

opposite dir^n

$(+ve)$

$O \Rightarrow P = P$

$② \rightarrow P = P \pm \rho g h$

Molecular Mom. | in   out

(1) $$\frac{(\tau_{rz} \times 2\pi r L)\big|_r - (\tau_{rz}\, 2\pi r L)\big|_{r+\Delta r}}{2\pi r \Delta r L}$$

S.A

(2) $$\frac{(\rho v_z) v_z \cdot 2\pi r \Delta r\big|_{z=0} - (\rho v_z) v_z \cdot 2\pi r \Delta r\big|_{z=L}}{2\pi r \Delta r L}$$

C.S

(3) $$\frac{P \cdot 2\pi r \Delta r\big|_{z=0} - P\, 2\pi r \Delta r\big|_{z=L}}{2\pi r \Delta r L}$$

C.S

(4) $$\frac{\rho g_z \cdot 2\pi r \Delta r L}{2\pi r \Delta r L}$$